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Vascular plant diversity in an established Oil Palm Plantation

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Acknowledged by:
Department of Agriculture Republic of Indonesia
IPOB
RSPO Roundtable on sustainable Palm Oil
Organized By:
WWF
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Flora diversity in monoculture areas

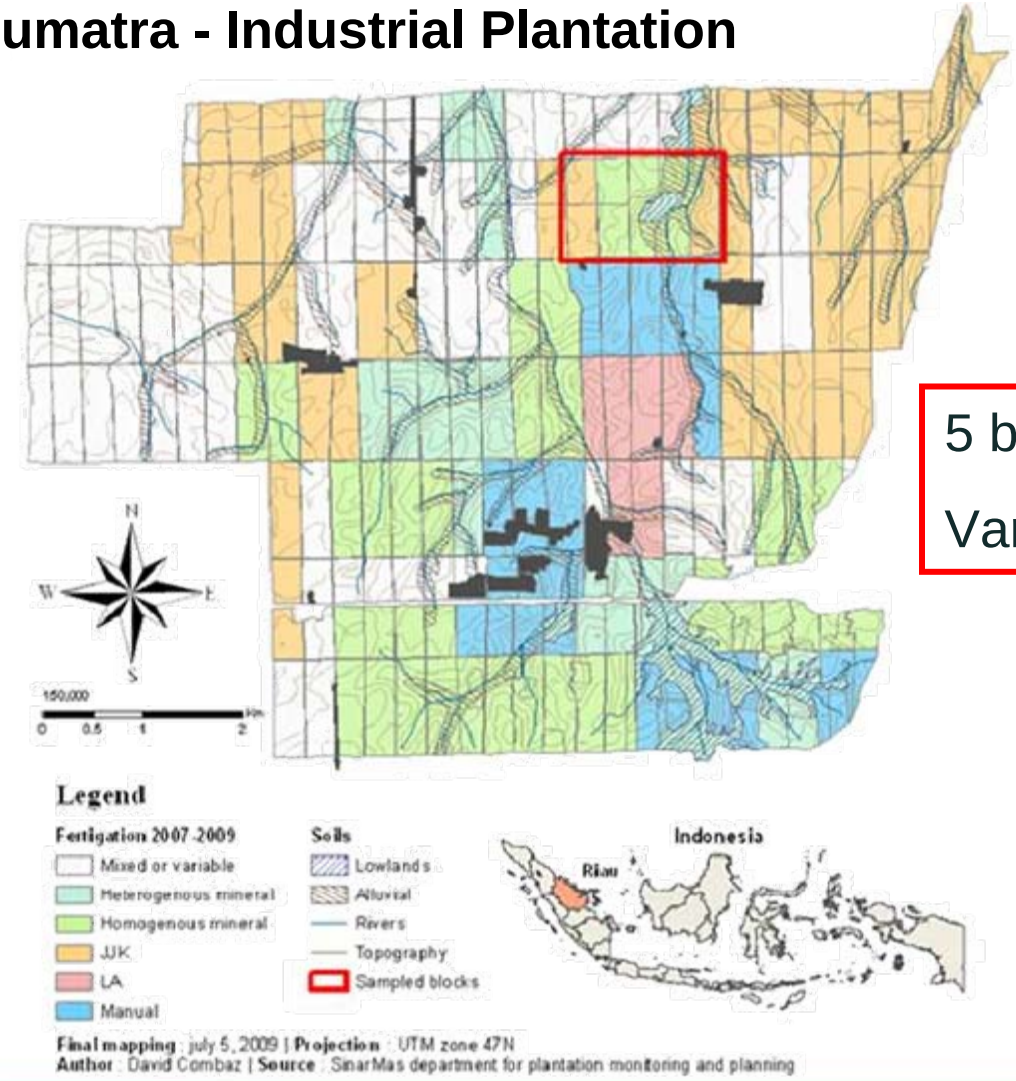
Flora diversity in palm oil plantation: ways toward an “ecological intensification”?

Objectives

- **Step 1: To characterize the composition and distribution of vascular plants within a plantation**
  - **Methodology**
  - **Result**
- **Step 2: To identify the influencing factors: environmental variables and agricultural practices**
- **Step 3: To encompass more complex & complete dimensions of biodiversity**
- **Step 4: To integrate these results into a biodiversity assessment grid**

Location

Sumatra - Industrial Plantation



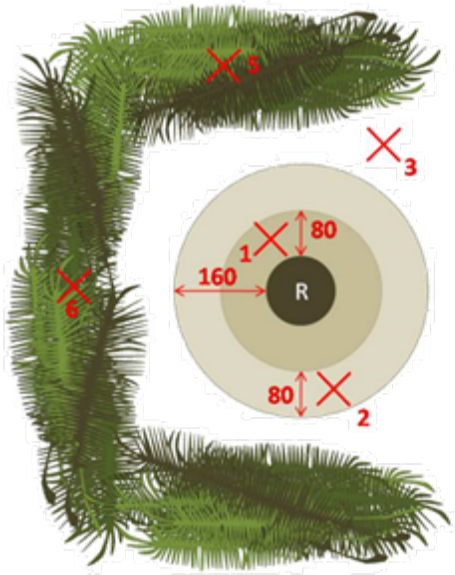
5 blocks = 150 ha

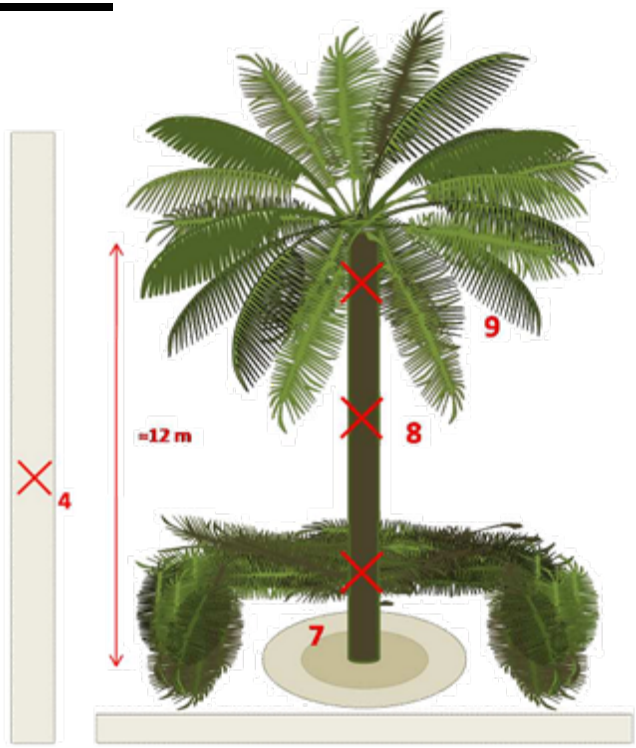
Variables: soil/water + fertilization

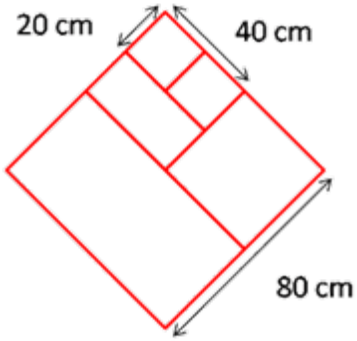
Material - Method

Light	Seed dispersal	Soil properties	Disturbance
Distance to closest palm			
Dead palms around			
Sampling height			
Distance to border			
Distance to river			
	Topographic situation		
	Steepness of slope		
		Fertilization	
		Frond bases abundance	
			Dead weeds abundance

Material - Method







1. Inner circle
2. Outer circle
3. Interval
4. Harvesting path
5. Windrow
6. Fronds pile
7. Stem basis (1-2 m)
8. Stem middle (5-6 m)
9. Under crown (9-10 m)
10. **Dead palm**
11. **Border**
12. **River bank**

12 stations

147 sampled sites


18.01.2010 10:02

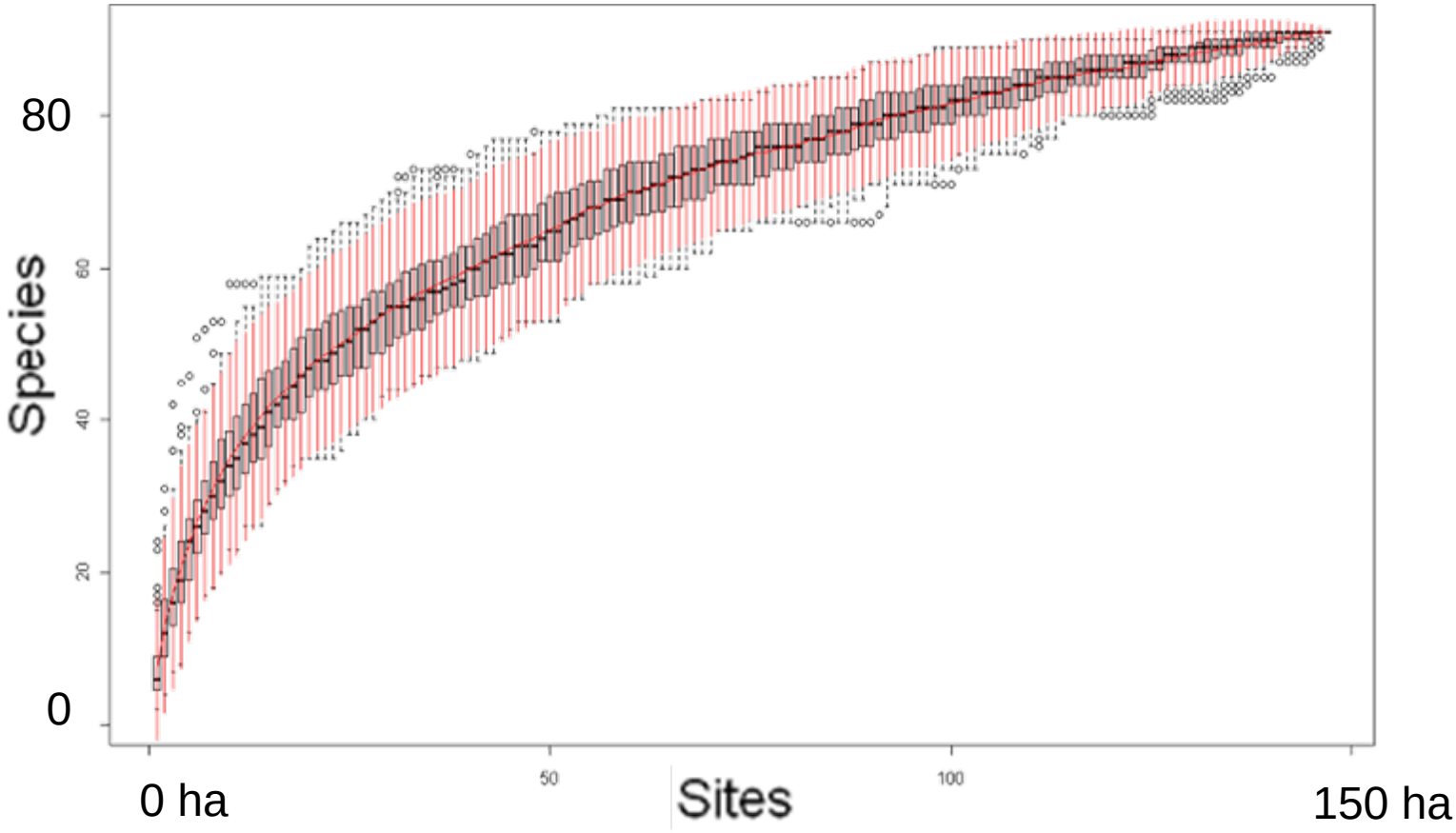
Results

91 species (150 ha)

- 45 Dicotyledones
- 24 Monocotyledones
- 22 Pteridophytes

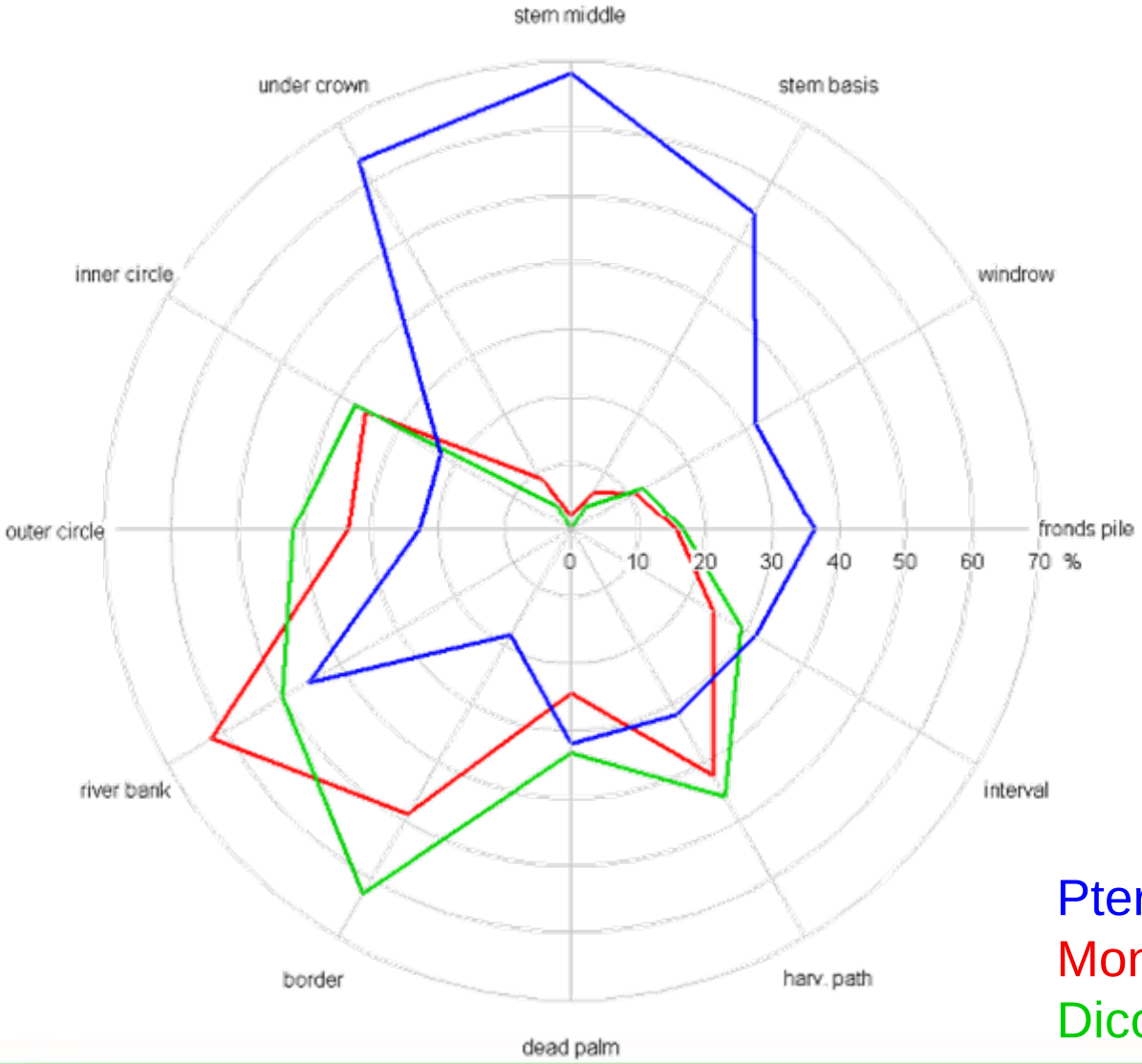
Observed vs real diversity

Species accumulation with sampling effort



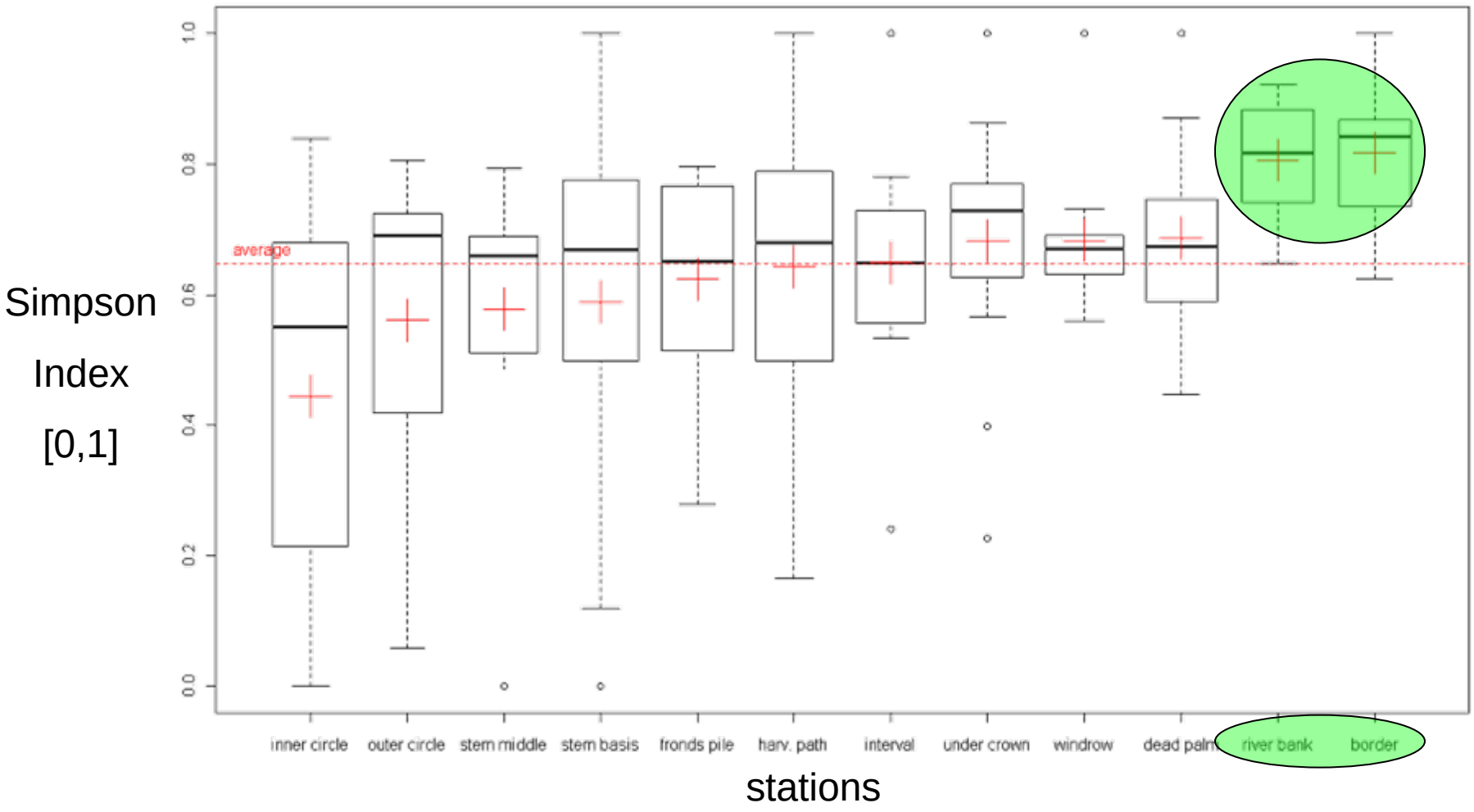
Extrapolation: **96 to 121 species**
75 – 93 % observed

Results : Distribution among stations

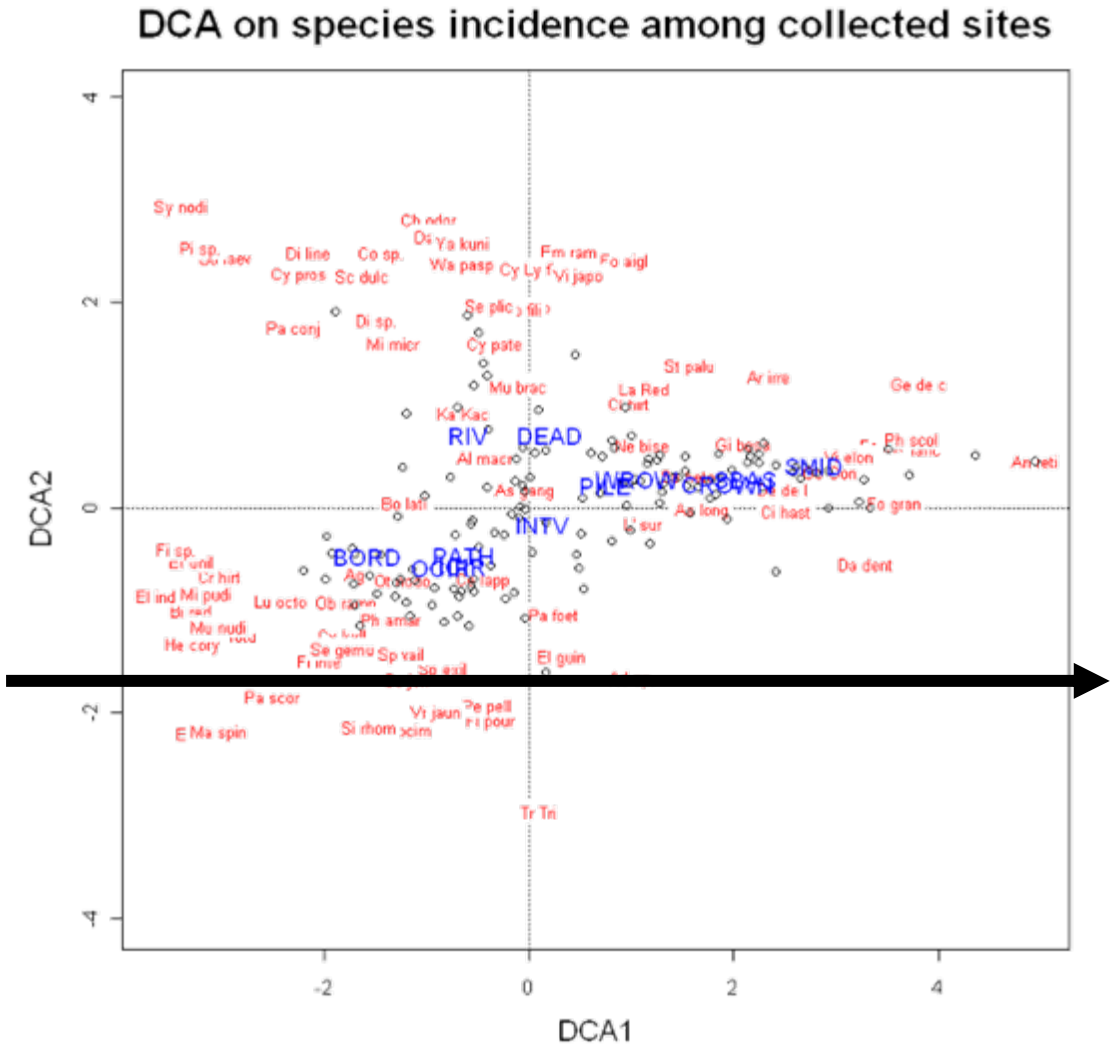


Pteridophytes
Monocotyledones
Dicotyledones

Results : Distribution of species within stations



Drivers of the distribution of species



on ground

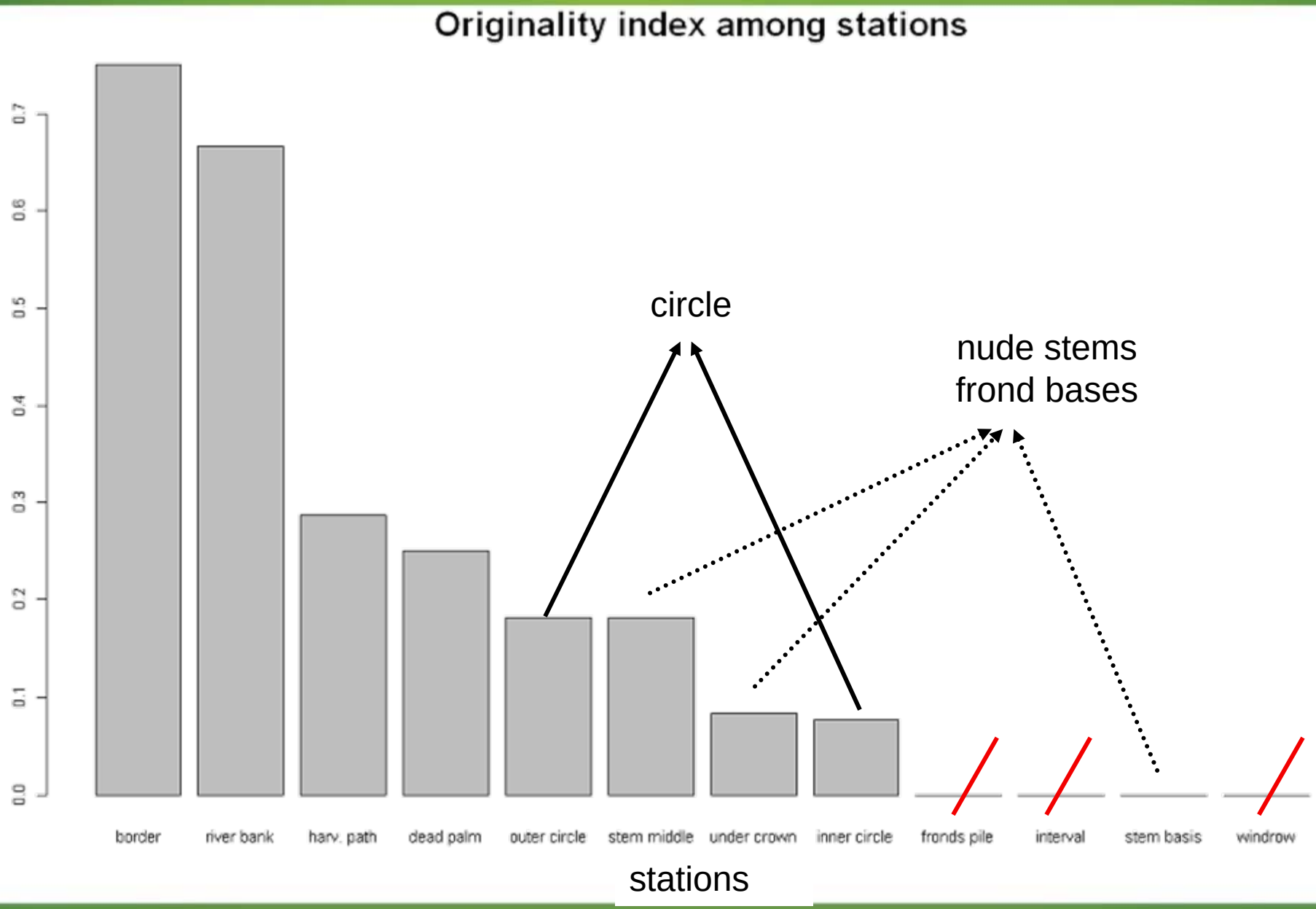
on stem

Hypothesis on environmental drivers

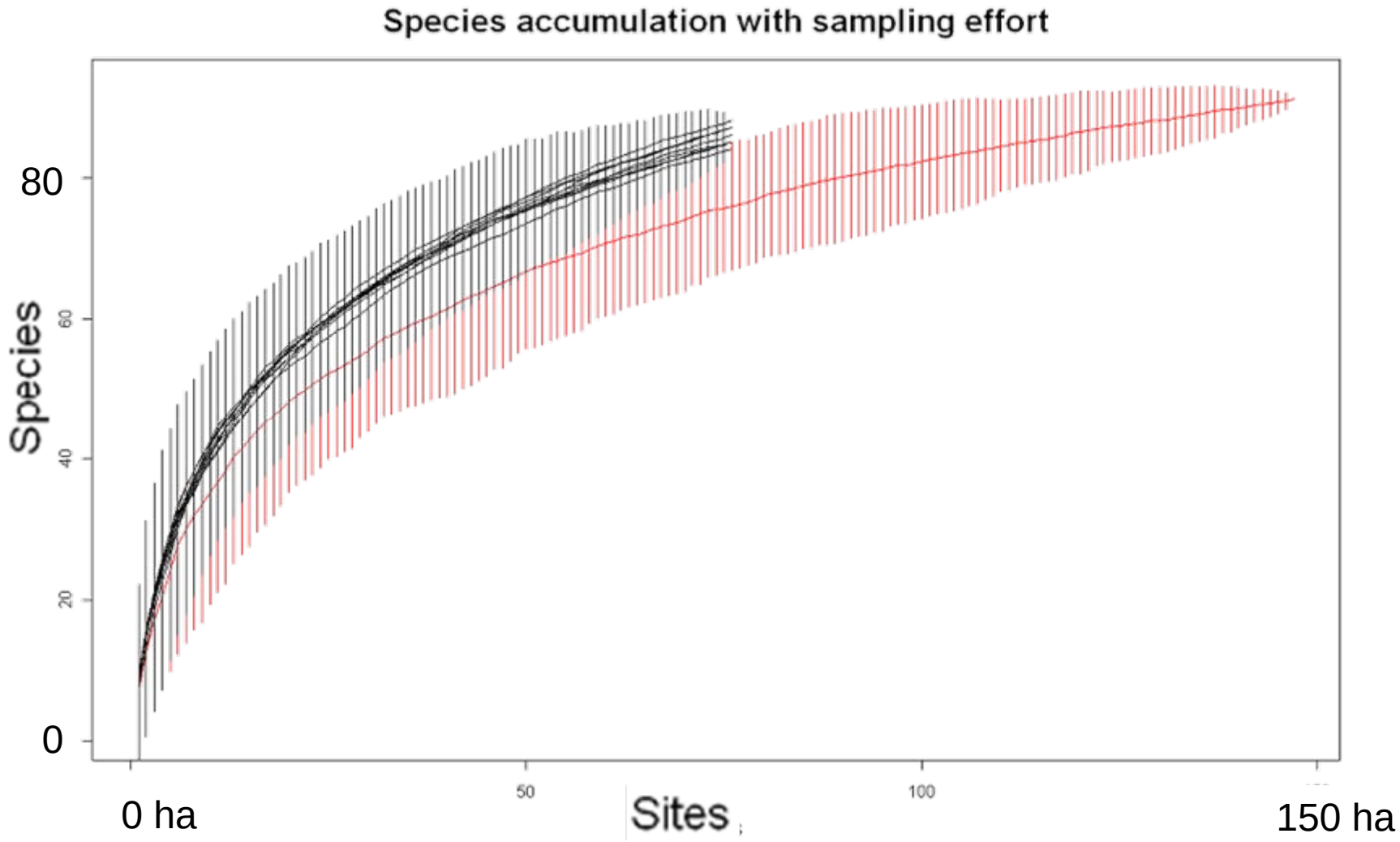
{inner circle; outer circle; harvesting path; border}:
« opening » gradient, light abundance, more expected vegetative reproduction

{frond pile; windrow; fb. abundant; fb. scarce; fb. absent}:
« Organic Matter OM » gradient, shade tolerant species

{river bank; dead palm}:
soil properties and water content, OM, light abundance


Originality index among stations
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
circle
nude stems
frond bases
border
river bank
harv. path
dead palm
outer circle
stem middle
under crown
inner circle
fronds pile
interval
stem basis
windrow
stations

Optimizing sampling effort



Conclusions & perspectives

- **Step 1: To characterize the composition and distribution of vascular plants within a plantation**
  - more sampling on going
  - valuing data on cover percentages

- **Step 2: To identify the influencing factors: environmental variables and agricultural practices**

  detailed protocols to test for most influencing drivers
  in depth study of plant physiology

- **Step 3: To encompass more complex & complete dimensions of biodiversity:**
  - the ecological functions of encountered species
  - the diversity and structure at the landscape scale (beta diversity, connectivity elements, etc.)
  - the dynamics (age, native/invasive…)

- **Step 4: To integrate these results into a biodiversity assessment grid**

Thank You

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